

AMENDMENTS TO THE CLAIMS:

Please cancel claim 4. Claims 1 and 5-8 are currently amended.

The following listing of claims will replace all prior versions of claims in the present application. No new matter has been added to the claims.

Listing of Claims:

1. (Currently Amended) A gas cooling type vacuum heat-treating furnace incorporating a gas cooling furnace for cooling an article which has been heated, with pressurized circulation gas, characterized in that

the gas cooling furnace comprises a cooling gas surrounding a cooling zone where the article to be heat-treated is stationarily set, and defining therein a vertical gas passage having a constant cross-sectional area, a gas cooling and circulating device for cooling and circulating gas vertically flowing in the cooling chamber, a gas direction switching device for switching directions of gas vertically flowing in the cooling chamber, and upper and lower straighteners blocking upper and lower ends of the cooling chamber, for causing a flowing velocity distribution of the gas passing therethrough to be uniform, wherein the gas cooling and circulating device comprises a cooling fan arranged adjacent to the cooling chamber, for sucking and pressurizing the gas having passed through the cooling chamber, and a heat-exchanger for indirectly cooling the gas sucked in to the cooling fan, and wherein

the gas direction switching device incorporates a hollow cowling surrounding the heat-exchanger, being spaced therefrom, and an elevating cylinder for moving the cowling up and down, the cowling has a lower suction port which is communicated with a lower part of the cooling chamber at a downward position, and an upper suction port which is communicated with an upper part of the cooling chamber at an upward position.

2. (Original) A gas cooling type vacuum heat-treating furnace as set forth in claim 1, characterized in that each of the upper and lower straighteners comprise a uniform distribution portion and a straightening portion which are stacked one upon another, or have both functions of a uniform distribution portion and a straightening portion,

the uniform distribution portion has a plurality of pressure loss inducing means uniformly arranged in a direction orthogonal to an upward gas stream, for applying a flow resistance corresponding to a pressure loss coefficient of not less than 0.1, to the upward gas stream so as to aim at uniformly distributing flow velocities, and

the straightening portion has a plurality of straightening grids for straightening flowing directions of the upward gas stream having passed through the uniform distribution portion.

3. (Original) A gas cooling type vacuum heat-treating furnace as set forth in claim 1, characterized by further comprising auxiliary distribution mechanisms for guiding directions of gas streams flowing into the cooling chamber upward and downward from the gas direction switching device.

4. (Cancelled)

5. (Currently Amended) A cooling gas direction switching device in a gas cooling type vacuum heat treating furnace ~~incorporating~~ comprising a cooling chamber surrounding a cooling zone in which an article to be heat-treated is stationarily set, and a gas cooling and circulating device for cooling and circulating gas passing through the cooling chamber, the heat-treating furnace being adapted to cool the heated article to be heat-treated with pressurized circulation gas,

characterized by a stationary partition plate partitioning between the cooling chamber and the gas cooling and circulating device, and a rotary partition plate which is rotated along an outer surface of the stationary partition plate, and

characterized in that the stationary partition plate has ~~an~~ includes at least one opening passing therethrough ~~over the entire surface thereof~~ which allows gas to circulate between a suction port and a discharge port of the gas circulating device, the rotary partition plate having a suction opening and a discharge opening which are partly communicated with ~~a~~ the

suction port and a discharge port of the gas cooling circulation device, whereby directions of the gas passing through the cooling chamber are alternately switched.

6. (Currently Amended) A gas direction switching device in a gas cooling type vacuum heat treating furnace as set forth in claim 5, characterized in that the cooling chamber has a gas passage vertically piercing therein, and an opening position is a position of the suction opening and a position of the discharge opening are set in such a way that:

when the gas flows downward in the cooling chamber, the suction opening is communicated only with a lower part of the cooling chamber while the discharge opening is communicated only with an upper part of the cooling chamber, and

when the gas flows upward in the cooling chamber, the suction opening is communicated only with the upper part of the cooling chamber while the discharge opening is communicated only with the lower part of the cooling chamber.

7. (Currently Amended) A gas direction switching device in a gas cooling type vacuum heat treating furnace as set forth in claim 5, characterized in that an opening position is a position of the suction opening and a position of the discharge opening are set in such a way that:

when the gas vertically flows in the cooling chamber, the suction opening is selectively communicated only with a lower part or an upper part of the cooling chamber while the discharge opening is selectively communicated only with the upper part or the lower part of the cooling chamber, and

when the gas horizontally flows in the cooling chamber, the suction opening is selectively communicated with only one of opposite sides of the cooling chamber while the discharge opening is selectively communicated with only the other of the opposite sides of the cooling chamber.

8. (Currently Amended) A gas direction switching device in a gas cooling type vacuum furnace as set forth in claim 5, characterized in that the gas cooling and circulating device comprises the-a cooling fan arranged adjacent to the cooling chamber, for sucking and circulating the gas having passed through the cooling chamber, and a heat-exchanger for indirectly cooling the gas discharged from the cooling fan.